

Unit 17
Day 2
Logarithmic Equations

Solve:

1)

$$7^x = 12$$

$$\log 7^x = \log 12$$

$$x \log 7 = \log 12$$

$$x = \frac{\log 12}{\log 7} \quad x \approx 1.2770$$

Solve:

2)

$$3^{2x-1} = 4^{x+2}$$

$$\log 3^{2x-1} = \log 4^{x+2}$$

$$(2x-1)\log 3 = (x+2)\log 4$$

$$2x \log 3 - \log 3 = x \log 4 + 2 \log 4$$

$$2x \log 3 - x \log 4 = \log 3 + 2 \log 4$$

$$x(2 \log 3 - \log 4) = \log 3 + 2 \log 4$$

$$x = \frac{\log 3 + 2 \log 4}{2 \log 3 - \log 4}$$

$$x \approx -2.357$$

Solve:

3)

$$e^{x^2} = 200$$

$$\ln e^{x^2} = \ln 200$$

$$x^2 = \ln 200$$

$$x = \pm \sqrt{\ln 200}$$

$$x = \pm 2.3018$$

Solve:

4)

$$\log_a(x+6) - \log_a(x+2) = \log_a x$$

$$\log_a \frac{x+6}{x+2} = \log_a x$$

$$\frac{x+6}{x+2} = x$$

$$x+6 = x^2 + 2x$$

$$0 = x^2 + x - 6$$

$$0 = (x+3)(x-2)$$

$$\cancel{x=-3} \quad \boxed{x=2}$$

Solve:

5)

$$\log(3x+2) + \log(x-1) = 1$$

$$\log(3x+2) + \log(x-1) = \log 10$$

$$\log(3x^2 - x - 2) = \log 10$$

$$3x^2 - x - 2 = 10$$

$$3x^2 - x - 12 = 0$$

$$x = \frac{1 \pm \sqrt{145}}{6}$$

$$\left\{ \frac{1 + \sqrt{145}}{6} \right\}$$

Solve:

$$6) \ln e^{\ln x} - \ln(x-3) = \ln 2$$

$$\ln x - \ln(x-3) = \ln 2$$

$$\ln \frac{x}{x-3} = \ln 2$$

$$\frac{x}{x-3} = 2$$

$$x = 6$$

Homework:

p. 402-3: 5-33 (odd)